

Subsurface Transformers and Network Protectors Subcommittee Meeting Minutes

Chairman: George Payerle

Vice-Chair: Tony Reiss

Meeting Date: 4/28/2021 Location: Virtual Time: 10:50 – 12:05 CT

Meeting Administration:

Meeting opened at 10:52 CT

- Chairman's Comments

The chair talked about Main Committee membership. Membership in IEEE and SA and PES are all required plus filling out an application listing subcommittee and working group participation and getting references. Forms are under Information on the Transformers Committee website.

Quorum determination – The meeting had 54 participants. There are 36 current members of whom 24 were present so quorum was achieved. . Five guests requested membership.

The agenda was approved and the minutes of F20 were approved without objection.

SC Members present

Israel	Barrientos	Prolec GE
Douglas	Craig	Richards Manufacturing Co.
Thomas	Dauzat	General Electric
Mark	Faulkner	EATON Corporation
Benjamin	Garcia	Southern California Edison
Carlos	Gaytan	Prolec GE
Said	Hachichi	Hydro-Quebec
Kenneth	Hampton	Baltimore Gas & Electric
Gary	Hoffman	Advanced Power Technologies
Brad	Kittrell	Consolidated Edison Co. of NY
Brian	Klaponski	Carte International Inc.
Alejandro	Macias	CenterPoint Energy
Daniel	Mulkey	Mulkey Engineering Inc.
George	Payerle	Carte International Inc.
James	Ratty	Electronic Technology Inc.
Clemens	Reiss IV	Custom Materials, Inc.
Pedro	Salgado	Electronic Technology Inc.
Dan	Schwartz	Quality Switch, Inc.
Jeremy	Sewell	Quality Switch, Inc.
Adam	Sewell	Quality Switch, Inc.
Igor	Simonov	Toronto Hydro

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Michael	Thibault	Pacific Gas & Electric
Alan	Traut	Howard Industries
John	Vartanian	National Grid
Joshua	Verdell	ERMCO

SC Guests Present

Nabi	Almeida	Prolec GE USA LLC
Gregory	Ante	Southern California Edison
Jared	Bates	Oncor Electric Delivery
Kevin	Biggie	Weidmann Electrical Technology
Douglas	Craig	Richards Manufacturing Co.
William	Elliott	General Electric
Benjamin	Garcia	Southern California Edison
Rob	Ghosh	General Electric
Zoran	Goncin	PTI Transformers
Kendrick	Hamilton	Power Partners, Inc.
Kendrick	Hamilton	Power Partners, Inc.
Ramadan	Issack	American Electric Power
Robert	Kinner	FirstPower Group LLC
Andrew	Larison	Hitachi ABB Power Grids
Christopher	Lianides	Southern California Edison
Jinesh	Malde	M&I Materials Inc.
Chris	Pitts	Howard Industries
Kevin	Rapp	Cargill, Inc.
Albert	Sanchez	Knoxville Utilities Board
Jaber	Shalabi	VanTran Industries, Inc.
Hamid	Sharifnia	Consultant
Avijit	Shingari	Pepco Holdings Inc.
Adam	Smith	Commonwealth Associates, Inc.
Radoslaw	Szewczyk	Specialty Products Poland
Timothy	Tillery	Howard Industries
Parag	Upadhyay	ABB Inc.
Duy	Vo	Central Maine Power (AVANGRID)
Shelby	Walters	Howard Industries
Leon	White	H2scan
Michael	Zarnowski	Carte International

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Working Groups Report:

- **C57.12.23 Single-Phase Submersible Transformers** working group –
- **NOT MEETING AT THIS TIME**

Alan Traut, Chairman,

- Revision due date: 12/31/2028
- PAR Approval Date: 12/5/2018
- PAR Expiration Date:

Stage: On break

- **C57.12.24 Three-Phase Submersible Transformers** working group –
Ben Garcia, Chairman; Tom Dauzat, Vice Chair; George Payerle, Secretary

- Approved: **12/7/2016**
- Revision Due Date: 12/31/2026
- PAR Approval Date:
- PAR Expiration Date: **12/31/23**

Stage: Recently Approved

IEEE/PES Transformers Committee Working Group on Requirements
For Three-Phase Submersible Transformers (C57.12.24)

Virtual Meeting Minutes

Tuesday, April 27, 2021

Members Present

Glenn	Andersen	Fayetteville PWC
Piotr	Blaszczyk	Specialty Transformer
John	Chisholm	IFD Corporation
Rhett	Chrysler	ERMCO
Douglas	Craig	Richards Manufacturing Co.
Michael	Dahlke	Central Moloney, Inc.
Thomas	Dauzat	General Electric
Larry	Dix	Quality Switch, Inc.
William	Elliott	General Electric
Benjamin	Garcia	Southern California Edison
Carlos	Gaytan	Prolec GE
Said	Hachichi	Hydro-Quebec
Kenneth	Hampton	Baltimore Gas & Electric
Michael	Hardin	H-J Enterprises, Inc.
John	Harley	FirstPower Group LLC
Ramadan	Issack	American Electric Power
Robert	Kinner	FirstPower Group LLC
Brad	Kittrell	Consolidated Edison Co. of NY
Brian	Klaponski	Carte International Inc.
Andrew	Larison	Hitachi ABB Power Grids
Alejandro	Macias	CenterPoint Energy
Kent	Miller	T&R Electric Supply Co.
Michael	Morgan	Duke Energy
Daniel	Mulkey	Mulkey Engineering Inc.
George	Payerle	Carte International Inc.
Jarrold	Prince	ERMCO
Juan	Ramirez	CELECO
James	Ratty	Electronic Technology Inc.
Pedro	Salgado	Electronic Technology Inc.
Avijit	Shingari	Pepco Holdings Inc.
Audrey	Siebert-Timmer	IFD Corporation
Igor	Simonov	Toronto Hydro
James	Spaulding	Fort Collins Utilities
Christopher	Sullivan	Westmark Partners
Michael	Thibault	Pacific Gas & Electric
Alan	Traut	Howard Industries
Jeremy	Van Horn	IFD Corporation
John	Vartanian	National Grid

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Guests Present

Scott	Abbott	PPG
Nabi	Almeida	Prolec GE USA LLC
Angela	Amador	EATON Corporation
Gregory	Ante	Southern California Edison
Kevin	Biggie	Weidmann Electrical Technology
Jeffrey	Door	H-J Family of Companies
Ali	Ghafourian	H-J Enterprises, Inc.
Zoran	Goncin	PTI Transformers
Jeffrey	Gragert	Xcel Energy
Kendrick	Hamilton	Power Partners, Inc.
Didier	Hamoir	Transformer Protector Corp
Gary	King	Howard Industries
Olivier	Lejay	Huaming USA Corp.
Christopher	Lianides	Southern California Edison
Gerald	Paiva	Consultant
Vinay	Patel	Consolidated Edison Co. of NY
Chris	Pitts	Howard Industries
Clemens	Reiss IV	Custom Materials, Inc.
Albert	Sanchez	Knoxville Utilities Board
Manish	Saraf	Hammond Power Solutions
Dan	Schwartz	Quality Switch, Inc.
Jeremy	Sewell	Quality Switch, Inc.
Adam	Sewell	Quality Switch, Inc.
Jaber	Shalabi	VanTran Industries, Inc.
Stephen	Shull	BBC Electrical Services, Inc.
Edward	Smith	H-J Family of Companies
Radoslaw	Szewczyk	Specialty Products Poland Sp. z o.o.
Joseph	Tedesco	Hitachi ABB Power Grids
Giuseppe	Termini	PECO Energy Company
Timothy	Tillery	Howard Industries
Joshua	Verdell	ERMCO
Duy	Vo	Central Maine Power (AVAN-GRID)
Shelby	Walters	Howard Industries
Bruce	Webb	Knoxville Utilities Board
Helena	Wilhelm	Vegoor Tecnologia Aplicada
Alan	Wilks	Consultant
Michael	Zarnowski	Carte International

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The S21 Webex meeting was called to order at 9:25 AM CT with Ben Garcia as chair, Tom Dautat as vice-chair and George Payerle as secretary. There were 38 members and 37 guests in attendance. Total membership is 51 so there was a quorum. Four guests requested membership.

Membership requirement for 12.24 is that you have attended 2 meetings in a row or 3 of the last 5. Four guests requested membership at the F20 meeting. Christopher Sullivan, Audrey Siebert-Timmer, and Ramadan Issack met membership requirements and were members at the S21 meeting. Kyle Zemanovic did not qualify due to the 3 in 5 meeting requirement. Dan Mulkey mentioned that Fred Friend had retired and will no longer be attending meetings.

Previously three people qualified and became members at the F20 virtual meeting -- Larry Dix, Fredric Friend and James Spaulding.

George Payerle moved to approve the agenda and Ken Hampton seconded. The motion passed unanimously. Ken Hampton moved to accept the minutes of the fall 2020 virtual meeting Dan Mulkey seconded. The minutes were approved unanimously. The chair called for essential patents. There were no disclosures. The chair showed and explained the copyright slides. Work on the PAR was begun at the S19 Anaheim meeting. The PAR will expire December 31, 2023. We have 3 working meetings to finalize the draft and get it to review and resolve comments.

Since the F20 meeting, the chair held 2 interim meetings to continue work on the standard. Ben acknowledged the help of the WG members who participated in this effort.

Old Business – the revision of Table 6 was originally meant to reconcile the English and metric dimensions. This has been done. Then it was decided to also address minimum thicknesses of the tank wall, coolers, tank cover, and tank bottom. Once further input from the corrosion task force is received, this work will continue. Will Elliott talked about what will be presented at the corrosion task force meeting.

Next the chair reviewed the items that were discussed at the interim meetings. There was discussion about whether to include the publishing date when citing another standard. Steve Shull pointed out that if we refer to a specific part of a standard, we must include the publishing date since standards are changed over time and the reference might no longer be valid if the standard cited is revised.

Section 5.2 kVA ratings – there was a discussion on the wording of this section as it relates to nonsymmetrical unbalanced loads of wye-wye connected units. Larry Dix said he had seen shunt bundles on small units. Andrew Larison of ABB said that they used 5 leg cores for wye-wye units. Gary King said in smaller units in smaller tanks there would be a tendency to use 3 leg cores.

A motion was made to resolve the issue by referring to C57.105 for information and proper design methods. Brian Klaponski made the motion and Mike Thibault seconded. The motion was passed without objection.

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Table 1 was revised to include applied voltage test and induced voltage test. Ken Hampton made a motion to approve the revision and Brian Klaponski seconded. The motion was passed without objection.

Section 5.4 Insulation levels – A suggestion was made by the taskforce to remove the second sentence (stating that BIL ratings are specified in C527.12.00-2015) as it was in direct conflict with the first sentence (stating that BIL ratings are specified in Table 2). The second sentence was deleted.

Brian moved to make the change in the first sentence and delete the second sentence. The motion was approved without objection.

Table 2 was revised to include 16,340 and 17,200 voltages. George Payerle moved and Ken Hampton seconded a motion to make those changes and it was passed without objection.

Section 6.2 editorial change was made adding the word ‘voltage’ in front of “regulation”.

Section 7.1 several non-technical editorial changes were made to this section.

A comment was made during the meeting that parking stand material should match that of the tank. Will Elliott commented that parking stands are required to be stainless steel because it is bare metal (won’t be painted) and is required for corrosion resistance.

Figure 1: Brian K. moved to add a diagram of a round tank to be placed alongside the pre-existing rectangular tank diagram showing dimensional callouts related to the maximum dimension table below. Will E. seconded. It was passed without objection.

There was no new business.

George P made a motion to adjourn which was seconded by Tom D

Next meeting October 17 to 21 (hopefully) I Milwaukee

Respectfully Submitted by: Ben Garcia, Chairman C57.12.24 Working Group

-
- **C57.12.40 Secondary Network Transformer** working Group –
Dave Blew, Chairman, Dan Schwartz, Secretary
 - Published 2017
 - Revision due date: **12/31/2027**
 - PAR Approval Date: 8/31/2012
 - PAR Expiration Date: **12/31/2023**

Stage: Submitted to Revcom on RevCom Agenda 04-May-2017

IEEE Transformers Committee
C57.12.40
Secondary Network Transformer Working Group

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Spring 2021 Virtual Meeting Minutes

WebEx

10:50 AM CST April 27, 2021

Members Present

Dave Blew (Chair)
Dan Schwartz (Secretary)
Douglas Craig
Tom Dauzat
Larry Dix
William Elliott
Mark Faulkner
Brad Kittrell
Brian Klaponski
Alejandro Macias
Dan Mulkey
George Payerle
James Ratty
Pedro Salgado
Avijit Shingari
Igor Simonov
Adam Sewell
Jeremy Sewell
Travis Spoone
John Vartanian

Company

PSE&G
Quality Switch
Richards Manufacturing Co.
Prolec GE
Quality Switch
Prolec GE
Eaton Corporation
Consolidated Edison Co. of NY
Carte International Inc
CenterPoint Energy
Mulkey Engineering Inc.
Carte International Inc.
Richards Manufacturing Co.
Electronic Technology Inc.
Pepco
Toronto Hydro
Quality Switch
Quality Switch
Eaton Corporation
National Grid

Guests Present

Scott Abbott
Gregory Ante
Kevin Biggie
Didier Hamoir
Ken Hampton
Jack Harley
Robert Kinner
Kent Miller
Vinay Patel
Eric Theisen
Bruce Webb
Bill Whitehead
Mike Zarnowski

Company

PPG
Southern California Edison
Weidmann Electrical Technology
Transformer Protector Corp.
Baltimore Gas & Electric
First Power Group LLC
First Power Group LLC
T&R Electric Supply
Consolidated Edison Co. of NY
Metglas, Inc.
Knoxville Utilities Board
Siemens Energy
Carte International Inc.

*Requested Membership

- The group met on Tuesday, April 27, 2021 at 10:50 AM CST with 20 members and 13 guests. Zero (0) guests requested membership. Quorum was achieved with 20/29 (69%) of members present.

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- A call for patents was made; none were mentioned.
- Copyright requirements were reviewed by the Chair.
- An agenda was presented for approval. Motion to approve was made by Mark Faulkner and seconded by Brian Klaponski. The agenda was approved unanimously.
- The minutes of the October 20, 2020, meeting on WebEx were reviewed. A motion to approve was made by George Payerle and seconded by Jeremy Sewell. The minutes were approved unanimously.
- The Chair reviewed that the PAR was approved and became active May 21, 2019 and expires December 31, 2023.
- Old Business - The Chair reviewed the previous meetings list of topics to be addressed in the next revision of C57.12.40 and the following items were discussed:
 - John Vartanian (National Grid) and Brad Kittrell (Consolidated Edison) presented on Cathodic Protection initiatives at each respective company to provide some background on CP methods used at each company. Both presenters fielded multiple questions.
 - John Vartanian and Brad Kittrell presented on their respective company's primary switch location methodology regarding safety and operational requirements. Both presenters fielded questions on their respective methodologies.
 - Cory Morgan (Eversource) was to present on primary switch testing requirements; however, he was unable to make this meeting. He will present at the next meeting in the fall.
 - Will Elliott (Prolec GE) presented on the difference in measurements of the two liquid types in Tables 8 & 9. Mike Zarnowski (Carte) presented a recommendation to update wording in Tables 8 & 9 based on fluid type. It was agreed to make the updates in the draft and have discussion and vote on the changes at a later meeting.
 - Dave Blew agreed to conduct research to determine if there are any end users that still require fluids other than mineral oil or FR3 in transformer manufacture; other fluids would include silicone and BETA among others. He will also check with manufacturers to determine if there is any requirement for those fluids in orders.
 - A proposal was provided by Brian Klaponski for removal of Table 7 and updating Section 5.6 wording to accommodate the removal. It was agreed to make the changes in the draft and move any discussion and approval to a later meeting date.
 - There was discussion on developing wording and scoping on improved bushing standardization in the standard for the group to review, but there was some confusion on what the actual request was at the previous meetings. Dave Blew suggested that we should discuss standardizing primary bushing sizing and capacity. Mike Zarnowski agreed to provide wording for the next meeting.

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- Dan Schwartz reviewed C57.12.24 compared to C57.12.40 and identified discrepancies between the two standards. Dave Blew, Mike Zarnowski, and Brad Kittrell agreed to review the list and provide suggestions for trying to keep consistency between the two standards.
 - Type testing for arc withstand was tabled until future meetings due to intellectual property concerns of each manufacturer and if that type of test can be developed.
- New Business – The Chair opened the discussion on any new items the group felt needed to be addressed in the next revision. No new items were brought forward.
- The Chair discussed that we have a few meetings to hash out the proposed modifications to the current revision, but that we must be diligent about doing so in order to finish the next revision in a timely manner.
- The meeting was adjourned at 12:05 PM CST with the next meeting set for Milwaukee, WI on October 20th, 2021.

Respectfully submitted,
D. Schwartz, Secretary

Document #: C57.12.44

Document Title: **STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS**

Chair: Mark Faulkner **Vice-Chair** Alex Macias

Secretary n/a
M

Current Draft Being Worked
On: DRAFT 10 **Dated:** April 26, 2021

Meeting Date: April 26, 2021 **Time:** 3:45PM CT

Meeting Attendance

Activity Name: C57.12.44 WG Secondary Network Protectors
 Activity ID:
 Number of Members in Activity = 20
 Number of Members Present = 16
 Quorum Present = 80%
 Number of attendees = 22

Dan Schwartz	Quality Switch	member
Dan Mulkey	Dan Mulkey Consultant	member
Brian Klaponski	Carte	member
Thomas (Tom) Dauzat	Prolec/GE	member
pedro salgado	ETI-NJ	member
George	Carte	member
James Ratty	ETI-NJ	member
Jeremy Sewell	Quality Switch	member
Travis Spoone	Eaton	member
Alex Macias	CenterPoint Energy	member
DougC	Richard Mfg.	member
john vartanian	National Grid	member
Mark Faulkner	Eaton	member
Igor Simonov	Tornoto Hydro	member
Brad	ConEd	member
Will Elliott	Prolec/GE	member
Malia Zaman	IEEE	guest
Kevin Biggie	Weidmann	guest
Duy Vo	Central Maine Power	guest
Vinay	ConEd	guest
Michael Zamowski	Carte	guest

Subsurface Transformers and Network Protectors

Subcommittee Meeting Minutes

Meeting Minutes:

The minutes shall record the essential business of the Working Group, including the following items at a minimum:

1. Meeting called to order
 - a. 3:47 PM
2. Quorum Verification
 - a. Quorum was confirmed via Encore polling process
3. Confirmation of the essential patent statement and responses
 - a. No conflicts presented to group
4. Copyright requirements were reviewed by the Chair
5. Approval of minutes of the previous meeting
 - a. Minutes presented to group
 - b. Motion to approve Dan Mulkey, 2nd George P.
 - c. Minutes approved unanimously
6. Approval of agenda for this meeting.
 - a. Agenda presented to group=
 - b. Agenda approved unanimously
7. Meeting Discussion
 - a. Ballot approval process
 - i. **Chair to make motion to the Subcommittee to obtain approval for ballot**
 1. **Brain K. made a motion (2nd Dan Mulkey) was presented to the WG to send the current draft of the standard to the Subcommittee**
 2. **WG approved unanimously**
 - ii. Deadline to submit is October 18, 2021
 - b. Pending response of MEC review
 - i. Task Group (TG) to make changes recommended by MEC; any conflicts to be address with MEC
 - ii. TG: Mark Faulkner, Doug Craig, Dan Mulkey and Cory Morgan
 - c. Releasing Standard for approval/comments
 - i. TG to address all comments submitted
 - ii. Any technical comments to be addressed by TG and then presented to the WG members
8. PAR expiration confirmed to be 12/31/2021

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9. Meeting adjourned at 5:00 pm

10. Fall meeting--date and location

- a. Milwaukee, Wisconsin, USA
- b. Date: October 17-21, 2021

Submitted by: Mark Faulkner

Date: 04/28/2021

- **C57.167 Guide for Monitoring Distribution Transformers** working group – Gary Hoffman, Chairman, Mike Thibault, Secretary
 - Revision due date: **N/A – new standard**
 - PAR Approval Date: **6/14/2018**
 - PAR Expiration Date: **12/31/2022**

Gary said he will summarize the meeting in the Dist SC but highlighted that the survey on load tap changers was conducted and several meetings have been held in 2020. There are plans for a January 2021 Google poll to STNP and DIST

Document #:	n/a		
Document Title:	Corrosion Effects on Subsurface Transformers		
Chair:	Will Elliott	Vice-Chair	Justin Minikel
Secretary	Audrey Siebert-Timmer	Per Cent Complete	0
Current Draft Being Worked On:	n/a	Dated:	n/a
Meeting Date:	April 27, 2021	Time:	2:20 PM CST
Attendance:	Members	28	
	Guests	50	
	Total*	78	

* For details of attendance, please refer to AMS system of the Transformers Committee

Attending Members:

Martin Bachand, Cloverdale Paint Inc.	Dwight Parkinson, EATON Corporation
Thomas Dauzat, Prolec GE	George Payerle, Carte International Inc.
William Elliott, Prolec GE	James Ratty, Electronic Technology Inc.
Benjamin Garcia, Southern California Edison	Pedro Salgado, Electronic Technology Inc.
Zoran Goncin, Partner Technologies Inc.	Adam Sewell, Quality Switch, Inc.
Chris Guertin, Cloverdale Paint Inc.	Avijit Shingari, Pepco Holdings Inc.
Said Hachichi, Hydro-Quebec	Audrey Siebert-Timmer, IFD Corporation
Jane Hall, Cloverdale Paint Inc.	Igor Simonov, Toronto Hydro
Ramadan Issack, American Electric Power	Jonathan Sinclair, PPL Electric Utilities
Robert Kinner, FirstPower Group LLC	Edward Smith, H-J Family of Companies
Brad Kittrell, Consolidated Edison Co. of NY	Michael Thibault, Pacific Gas & Electric
Brian Klaponski, Carte International Inc.	Alan Traut, Howard Industries
Justin Minikel, EATON Corporation	John Vartanian, National Grid
Tyler Morgan, Duke Energy	
Daniel Mulkey, Mulkey Engineering Inc.	

Attending Guests

Scott Abbott, PPG	Edmundo Arevalo, Bonneville Power Administration
*Nabi Almeida, Prolec GE	Elise Arnold, SGB-SMIT Group
Greg Ante, Southern California Edison	Ryan Bishop, Minnesota Power

Darren Brown, Howard Industries
Erich Buchgeher, Siemens Energy
*Paul Chisholm, IFD Corporation
Rhett Chrysler, ERMCO
Michael Dahlke, Central Moloney, Inc.
Paul Florida, Howard Industries
James Gardner, SPX Transformer Solutions,
Inc.
Carlos Gaytan, Prolec GE
Ken Hampton, Baltimore Gas & Electric
George Jalhoum, PPL Electric Utilities
Kristin James, EATON Corporation
Anna Johnson, Arkem
Krzysztof Kulasek, Hitachi
ABB Power Grids
Michelle Kutzleb, TJ|H2B
Andrew Larison, Hitachi ABB Power Grids
Christopher Lianides, Southern California Edison
Tiffany Lucas, SPX Transformer Solutions,
Inc.
*Alejandro Macias, Centerpoint Energy
Nitesh Patel, Hyundai Power Transformers
USA
Vinay Patel, Consolidated Edison Co. of NY
Chris Pitts, Howard Industries
Jarrod Prince, ERMCO
Jonathan Reimer, Fortis BC
(*Attendee requested membership)

Mahesh Sampat, Independent Consultant
Anil Sawant, Virginia Transformer
Jeff Schneider, Spire Power Solutions
*Dan Schwartz, Quality Switch, Inc.
Jeremy Sewell, Quality Switch, Inc.
Jaber Shalabi, Virginia Transformer
Dave Sheehan, HICO America
Stephen Shull, BBC Electrical Services, Inc.
James Spaulding, City of Fort Collins
Neil Strongosky, Memphis Light, Gas &
Water
Marc Taylor, Cogent Power Inc.
Eric Theisen, Metglas
Timothy Tillery, Howard Industries
Jeremy Van Horn, IFD Corporation
D Cenral Maine Power
*Hugh (Mike) Waldrop, Memphis Light,
Gas & Water
Shelby Walters, Howard Industries
Daniel Weyer, Nebraska Public Power
District
Leon White, H2 Scan
Alan Wilks, Independent Consultant
*Michael Zarnowski, Carte International
Inc.
Kyle Zemanovic, EATON Corporation

Meeting Minutes:

1. Will Elliott called the meeting to order at 2:20 PM CST.
2. Opening remarks and announcements.
3. Will Elliott reviewed IEEE Essential Patent Claims and SA Copyright Policy. No issues were raised.

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4. Membership changes were noted:
 - i. Added: Juan Carlos Cruz Valdes, Zoran Goncin, Said Hachichi, Jane Hall, Micheal Morgan, Aniruddha Narawane, James Ratty, Pedro Salgado, Jonathan Sinclair, Edward Smith
5. Quorum was verified. The working group consisted of 36 members, requiring **19** for quorum. **26** members were confirmed through the WebEx poll. **28** members were confirmed afterwards through the attendance records.
6. Will Elliott requested approval of the minutes. George Payerle made a motion, seconded by Tom Dauzat for approval of the minutes. **Minutes were unanimously approved.**
7. Will Elliott requested approval of the agenda. Martin Bachand made a motion, seconded by Brian Klaponski for the approval of the agenda. **Agenda was unanimously approved.**
8. New Business:
 - i. Historical Corrosion Reports
 - a. Will Elliott review historical corrosion reports that are available including:
 1. 1968 GE corrosion report by Gary Nonken which is likely the origin of AISI 409 for 1-ph submersibles.
 2. 1968 IEEE transaction article “Fundamentals of Corrosion and Corrosion Control for Residential Subsurface Transformers” also by Gary Nonken from GE.
 3. 1972 IEEE transaction article “Corrosion Experience with Subway Transformers” by John Donnelly from Boston Edison.
 4. 1991 GE / ConEd corrosion report. Will Elliott has a request in process to release the this to the taskforce.
 - ii. Material Compatibility Testing: Pitting Corrosion 3D CT-Scan Results
 - a. Will Elliott reviewed 3D CT-scan test method and results performed on samples from the material compatibility tests. This test was performed in attempt to provide a more accurate measurement for pitting depth (vs the caliper method used in the Fall 2020 report). Reviewed report will be posted in the website. Key findings / observations were:
 1. Corrosion Rate was highest with Silicon-Bronze materials (results were comparable to previous findings in the Fall 2020 report). It was noted that measured corrosion rates do not reflect actual service environments, but rather indicate relative performance.
 2. Silicon-Bronze materials had a large percent pitted surface area.
 3. Coating bare Copper cathode reduced corrosion rate.

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4. Easier machinability of stainless-steel alloys come at the cost of corrosion resistance.
- b. Tiffany Lucas asked samples were weight to calculate mass loss. Will Elliott confirmed this measurement was taken; results are included in the Fall 2020 report.
- c. Tom Dauzat commented that the bare copper cathode is simulating exposed copper in the vault.
- d. Zoran Goncin asked if pitting corrosion was observed on the threads. Will Elliott responded that none was observed. Tom Dauzat commented that this may be due to the test set up (bolts torqued together) which likely did not allow the electrolyte solution to go between tthreads.
- e. Zoran Goncin asked why 316 stainless-steel was not included. Will Elliott commented that one of the early questions for the task force was hardware compatibility and the materials tested are explicitly permitted for hardware in the current STNP equipment standards (so the materials selected were the ones they had readily available on hand).
- f. Zoran Goncin commented that they do not use 304 stainless steels because of galling. instead, they used 316 stainless steels. In these cases, they also recommend all components are 316 stainless steel rather than carbon steel.

iii. Taskforce Discission: Next Steps

- a. Will Elliott reviewed the proposed draft which was compiled as an informative guide for the equipment user. Proposed draft was emailed to taskforce members and included the following sections:
 1. Guide Purpose
 2. Methods to Defining the Environment
 3. Vault Design Considerations
 4. Design Considerations for Equipment Enclosures with Superior Corrosion Resistance
 5. Cathodic Protection Guide
 6. Proposed Simulated Vault Corrosion Test Method
- b. Tom Dauzat asked about annealing for stress relaxation and SCC (stress corrosion cracking). Will Elliott commented there is a lot to the welding process.
- c. Tiffany Lucas commented that austenitic stainless steels can be susceptible to SCC and a stress relief heat treatment will help to prevent that. Tiffany commented that this is related to welding guidelines and we may not want to include this.
- d. Tom Dauzat commented that for paint touch-ups it is best to paint the entire affected area as it provides a coating that will limit crevices for corrosion.
- e. Dan Mulkey commented that the vast majority of subsurface transformers are installed in enclosures / chambers / spaces that are very small. Dan Mulkey

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recommended we distinguish the difference between a vault installation (e.g. where there is additional room around the transformer for crews to walk around) vs “surface operable” (e.g. where there is no additional room around the transformer). He stated the available space likely will define what you can or cannot do.

- f. Tom Dauzat commented that for 300 stainless-steel transformers it is difficult for crews to see a pin hole leak versus copper bearing and/or 409 stainless-steel has a uniform rust/corrosion making it easier for crews to identify when to service the transformer.
- g. Dan Mulkey commented that standard installation processes have a bare copper ground rod over the vast majority installation will have the rod above water. Will Elliott agreed that keeping the copper out of the electrolyte will make a big difference, but cautioned what certainty we know where the water level is. commented that corrosion rates will likely be much lower in this case.
- h. Dan Mulkey commented that soil likely will change over time. Something to consider when soil testing water.
- i. Brad Kittrell commented that ConEd replaces anodes all the time (crews have spare parts in the truck). They use a “passive” (galvanic “sacrificial” anode) system.
- j. Tom Dauzat commented that painting the bare copper in the vault would extend the life of the anodes.
- k. Tom Dauzat made a motion for developing a PAR for a guide on corrosion (similar to what is available for Tap Changers). **There was no second, motion did not pass.**
- l. Edmundo Arevalo commented he would like the information to be included in the transformer specification.
- m. Brain Klaponski commented that it may be too early for a PAR. We need to continue gathering data to focus the scope (there is a lot in the proposed draft).
- n. Dan Mulkey commented the best time to submit a PAR in December as you get an extra year.
- o. Discussion was tabled as we ran out of time. **Will Elliott to call a meeting in two months to discuss further and assign out actions.**

9. Next meeting: is planned for October 18, 2021 in Milwaukee, Wisconsin USA

- i. The following seven attendees requested membership, and five will be added to membership for the Fall 2021 meeting: 6 requested membership ... need attendance sheet.
 - a. Attendees requesting membership which were approved based on attendance:
 - 1. Nabi Almeida, Prolec GE
 - 2. Paul Chisholm, IFD Corporation
 - 3. Alejandro Macias, Centerpoint Energy

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4. Dan Schwartz, Quality Switch, Inc.
 5. Mike Waldrop, Memphis Light, Gas & Water
 - b. Attendees requesting membership which did not meet attendance criteria:
 1. Michael Zarnowski, Carte International Inc.
 2. Ashmita Niroulaa, Ergon
10. The meeting was adjourned at 3:35 PM CST.

Submitted by: Audrey Siebert-Timmer

Date: 04/26/2021